

April 14, 1953

H. A. KULJIAN

2,634,449

THREAD MANUFACTURING APPARATUS

Filed April 1, 1950

4 Sheets-Sheet 2

Fig. 4

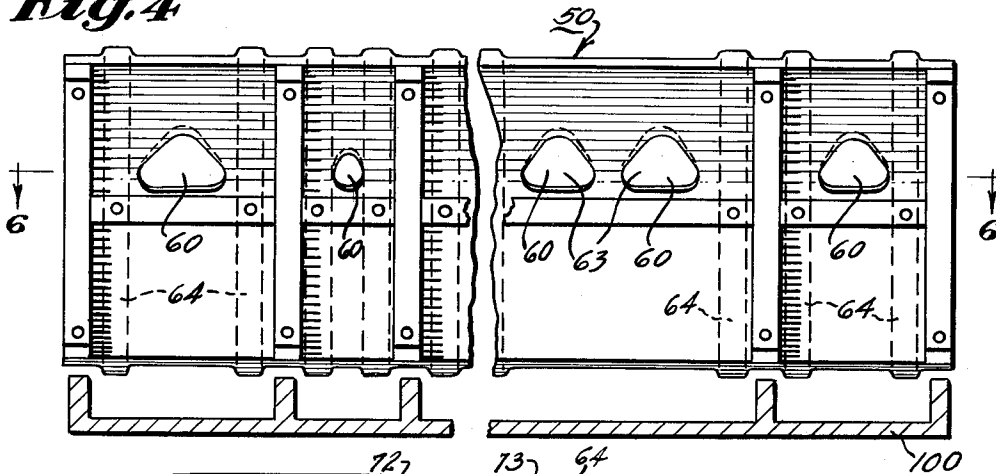
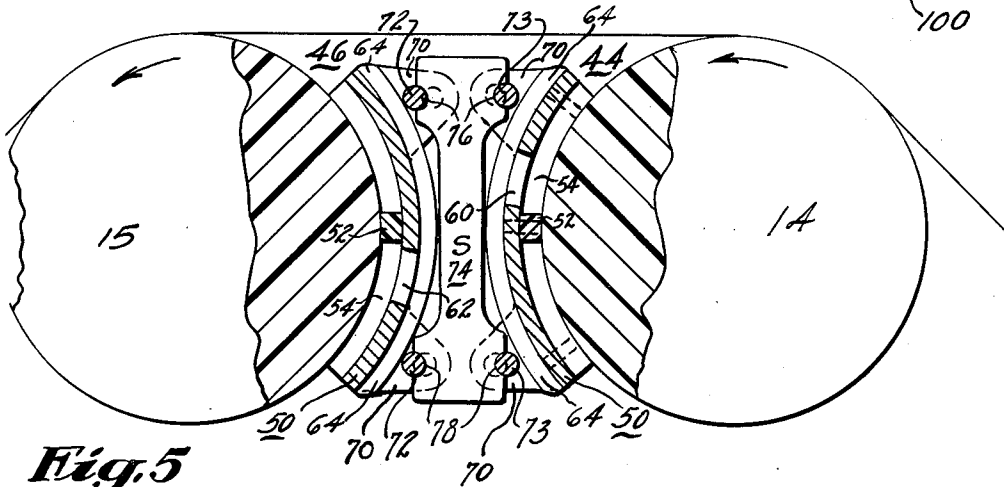


Fig. 5

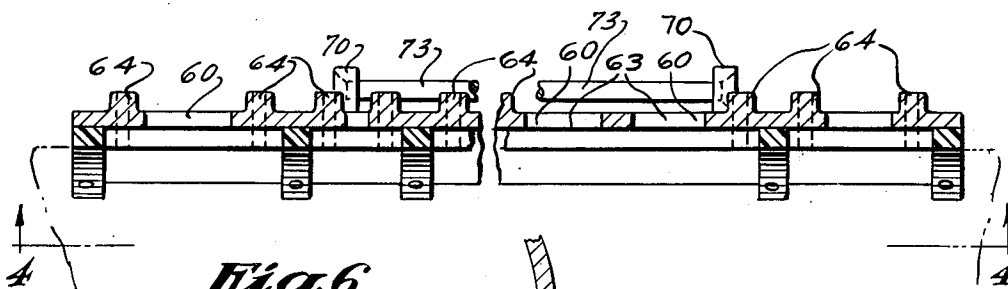


Fig. 6

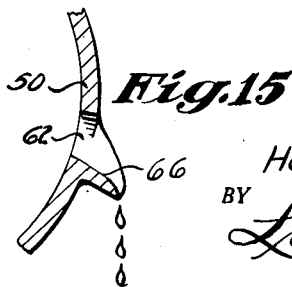


Fig. 15

INVENTOR.
Harry A. Kuljian
BY
Louis Necho
Attorney

April 14, 1953

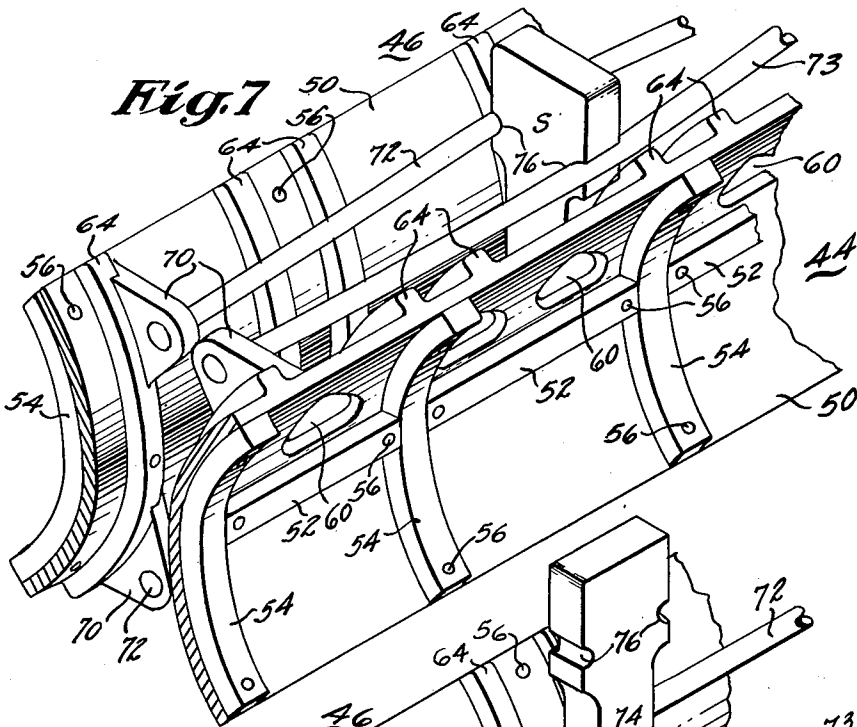
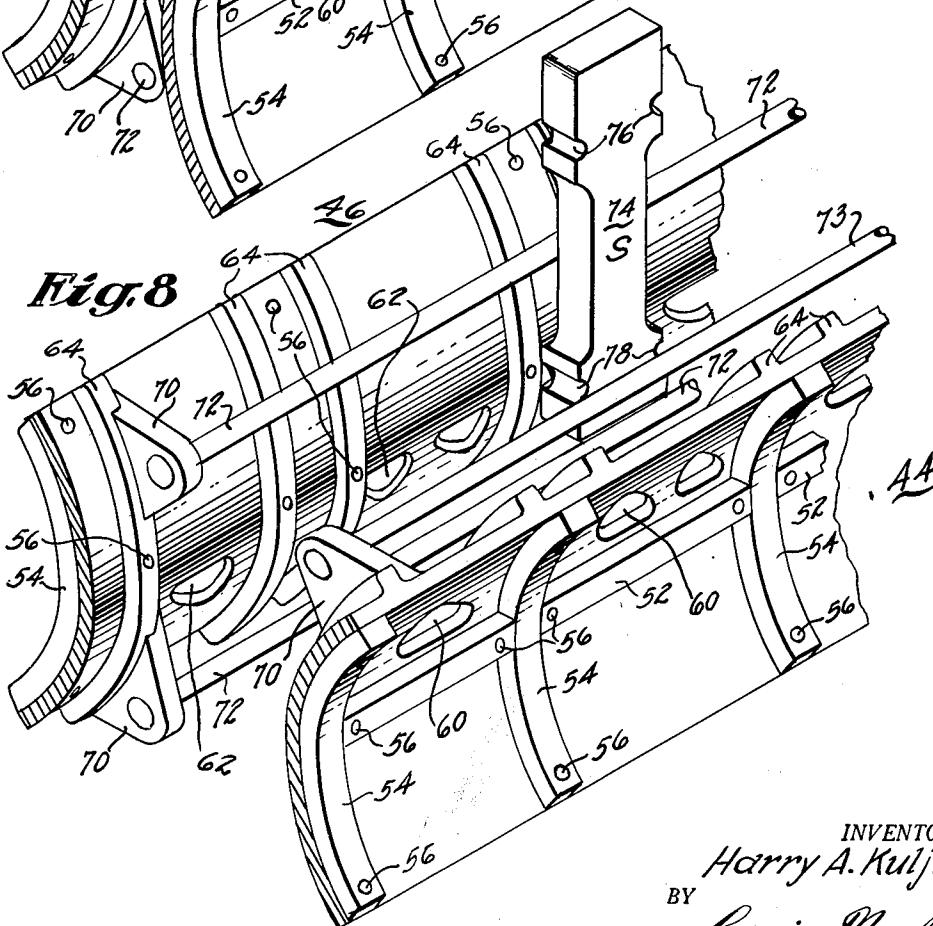
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4 Sheets-Sheet 3



April 14, 1953

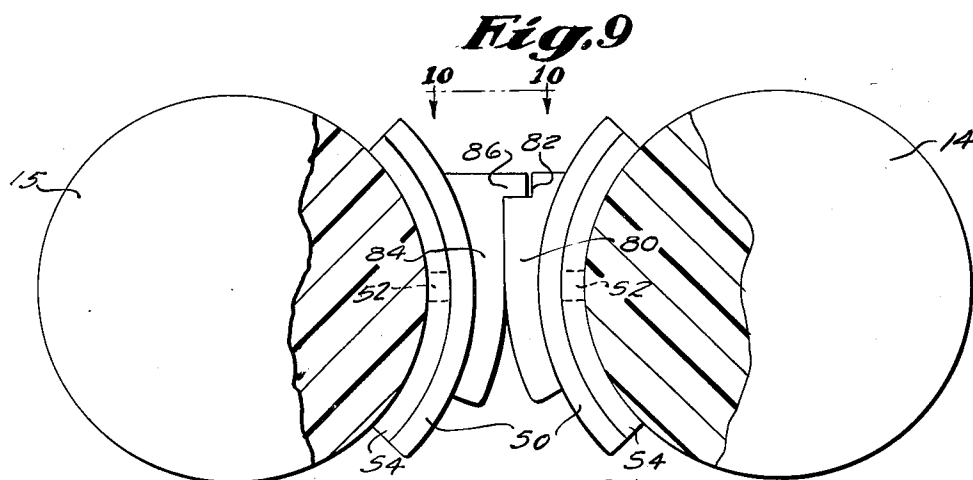
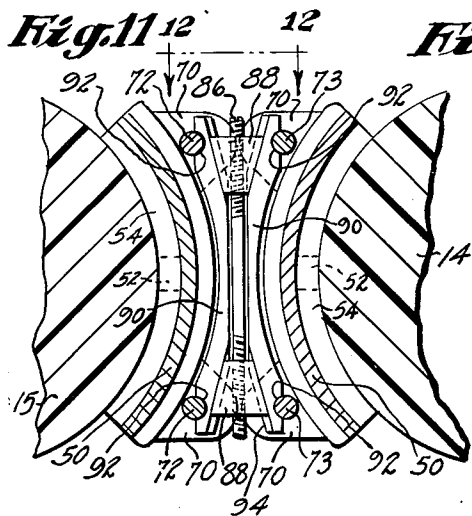
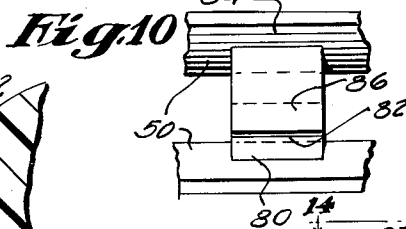
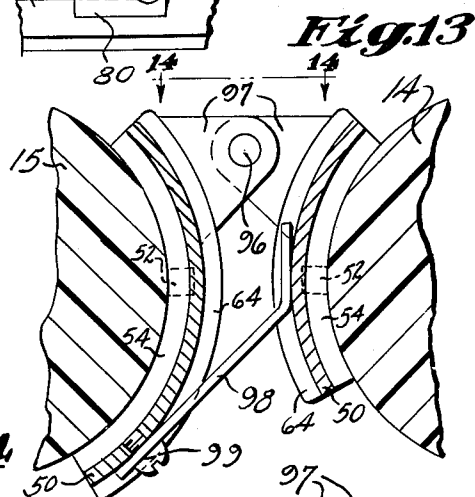
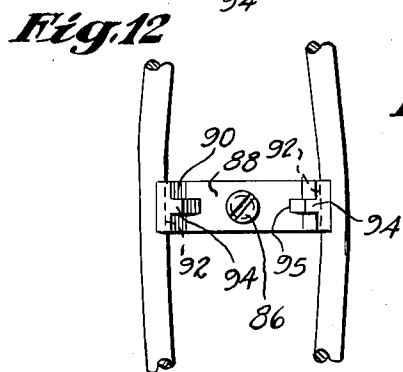
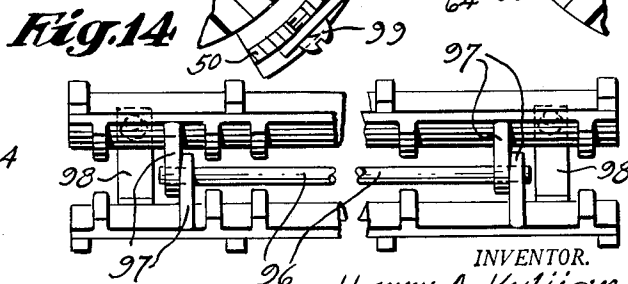
H. A. KULJIAN

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INVENTOR.
Harry A. Kuljian
BY
Louis Necho
Attorney

UNITED STATES PATENT OFFICE

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THREAD MANUFACTURING APPARATUS

Harry Asdour Kuljian, Merion, Pa., assignor to
The Kuljian Corporation, Philadelphia, Pa., a
corporation of Pennsylvania

Application April 1, 1950, Serial No. 153,459

14 Claims. (Cl. 15—256.5)

1

In the manufacture, or in the processing, of synthetic filaments, the filament is caused to move longitudinally of a thread storing and advancing reel formed of a plurality of rotating rolls, and various liquid re-agents are poured over the filament as it passes through successive zones along one or more of the rolls.

In order to make sure that the various liquids needed are present in sufficient quantities, and because it is difficult, if not impossible to gauge the liquid requirements exactly, it is the practice to supply the various liquids in relatively excessive amount. But, because at least some of the liquids used are expensive, because the presence of liquids in excessive quantities will result in intermingling of the various liquids delivered to adjacent zones on the roll with obviously undesirable consequences, and because the presence of an excessive quantity of one reagent or another may, of itself, produce undesired results, it is desirable to remove excess liquids so as to regulate the quantities of the various liquids which are allowed to remain on the filament or on the rolls during movement of the filament through successive zones along such roll. It is also desirable that the excess liquids be removed, as far as possible, in a segregated manner so as to facilitate reclamation and reconcentration of the various liquids.

To these ends, I have provided an improved, combined scraping or wiping and segregating device whereby excess liquids can be removed, in a segregated manner, from the surface of one or more rolls of the reel.

A scraping device of the type set forth must contact the roll with an accurately controlled and substantially constant pressure so as to remove liquids in a uniform manner.

It is therefore a further object of the invention to produce an improved combined scraping and segregating device which is adjustable and which, having been adjusted, will contact the roll with the desired uniform pressure.

A still further object is to produce an improved scraping and segregating device which will be inexpensive to make and easy to install or remove.

These and other objects are attained by my invention as set forth in the following specification and as shown in the accompanying drawings in which

Fig. 1 is a side elevational view of a synthetic filament manufacturing apparatus embodying my invention.

Fig. 2 is a sectional view taken on line 2—2 on Fig. 1, certain parts being omitted.

2

Fig. 3 is a fragmentary top plan view.

Fig. 4 is a side elevational view looking in the direction of line 4—4 on Fig. 6 and show the structure of the combined scraping and segregating device embodying the invention.

Fig. 5 is an enlarged fragmentary view, partly in section and partly in elevation, showing details of construction of the scraping and segregating device and its relation to the adjacent rolls.

Fig. 6 is a section taken on line 6—6 on Fig. 4.

Fig. 7 is an enlarged, fragmentary, perspective view of the combined scraping and segregating device shown detached from the reel but in the operative position it assumes when in use upon the reel.

Fig. 8 is similar to Fig. 7 but showing the manner in which the scraping and segregating device may be removed from the reel.

Fig. 9 is similar to Fig. 5 but showing a second embodiment of the combined scraping and segregating device.

Fig. 10 is a fragmentary top plan view looking in the direction of line 10—10 on Fig. 9.

Fig. 11 is similar to Fig. 5 showing a third embodiment of the combined scraping and segregating device.

Fig. 12 is a fragmentary top plan view looking in the direction of line 12—12 on Fig. 11.

Fig. 13 is similar to Fig. 5 but showing a fourth embodiment of the combined scraping and segregating device.

Fig. 14 is a reduced top plan view of the device shown in Fig. 13.

Fig. 15 is a fragmentary enlargement showing a detail of structure which is omitted from the other figures for clarity of illustration.

The apparatus illustrated includes a thread storing and advancing device formed of a plurality of rolls 10, 11, 12, 13, 14, 15, 16 and 17 which are arranged about a fixed central roll 18. The shafts of the rolls 10-17 are journaled for rotation in bearings, not shown, formed in, or carried by opposite end plates 20 and 22, and the rolls are rotated about their axes by motor M the shaft of which carries a gear which meshes with gears on the adjacent ends of the shafts of the rolls. Since the rolls may be rotated in any desired manner and since the means for rotating the rolls forms no part of the present invention, the manner in which the rolls are rotated is not shown nor described in detail. It is sufficient to point out that all the rolls are rotated at the same speed and that they are all rotated by a single, central gear. The end plates 20 and 22 are carried by central roll 18 which in turn is supported at one

end thereof by a suitable framework 24 so that the thread storing and advancing reel is mounted in cantilever fashion. The axes of the rotating rolls are skewed with reference to the axis of roll 18 (or to an imaginary, central, horizontal axis) in such a manner that if the rolls are rotated and if a filament 28 is wound about the supported, or right hand end of the reel, the filament will move in the form of a helix H, from the supported to the unsupported end of the reel.

The filament 28 may be in the nature of a freshly coagulated strand which is produced by extruding an appropriate solution through a nozzle 30 into a suitable coagulating bath 32, or it may be in the nature of an already formed filament fed to the reel from a spool or other source. The freshly coagulated filament is passed over one or more guide wheels 34 and one or more godet wheels 36 in any desired manner.

In order to complete the regeneration of a freshly coagulated filament, or in order to process other types of filaments, various liquid reagents and washes are supplied to the filament as it moves longitudinally of the reel. As shown, a series of pipes P1, P2, P3, P4, P5 etc. are arranged to deliver the respective treating liquids to the filament as the filament passes through zones on the roll 14. It will be noted that the end-most pipe P5 is spaced inwardly from the left hand end of the reel so as to provide a drying zone 40 in which no liquid is delivered and in which heat is applied to dry the filament.

As stated the quantity of the liquid delivered through each of the pipes is in excess of the exact requirements of the filament and if nothing is done, liquid delivered from pipe P2 will tend to flow longitudinally of the roll and to mix with liquids delivered from pipes P1 and P3. Also, the excess liquids which will drop from the rolls will be wasted.

In order to remedy this condition, I have provided the improved scraping and segregating device best shown in Figs. 4, 6, 7 and 8 and I have so located the scraping and segregating devices as to cause them to act on the rolls in the manner best shown in Figs. 2 and 5.

In the drawings I show the use of two such devices 44 and 46 located between, and arranged to act on, rolls 14 and 15 but it will be understood that additional scraping and segregating devices may be associated with as many of the remaining rolls as may be desired.

Since, except for being placed back to back, as shown in Figs. 2, 5, 7 and 8, the devices 44 and 46 are identical, a description of one of these devices will suffice.

Referring now to Figs. 4 to 8, it will be seen that each scraping and segregating device is formed of an elongated shell 50 which is curved transversely and the curvature of which corresponds to the curvation of the rolls forming the reel.

The shell 50 is preferably made of some material which is light and which is not corroded by the acid, alkali and other liquid reagents which are usually used in the treatment of the filament. A number of synthetic materials such as methyl methacrylate, phenol condensate etc. are available and will work satisfactorily. On the inner concave face of the shell I provide a longitudinal strip 52 and intersection transverse strips 54 all of which are preferably detachably secured in position by rivets 56. The strips 52 and 54 and the rivets 56 may be made of the same material from which the shell 50 is made, or they may be made from some other material possessing

the enumerated characteristics. It is also pointed out that the strips 52 and 54 and the rivets 56 should always be of such material and such shape as not to scratch the rolls and they should be easy to cast on machine.

The horizontal strip 52 is intended to scrape liquid off the entire surface of a roll which it contacts and the vertical strips are intended to prevent or minimize intermingling of a liquid delivered by one pipe such as pipe P3 with the liquids delivered by pipes P2 and P4. To this end, the strips 54 are spaced so that, when they contact the roll, they define zones of the desired lengths therebetween, and it will be seen from Fig. 1 that the discharge nozzles of the pipes register with the centers of the zones defined by juxtaposed strips 54. The liquids scraped off one roll by horizontal strip 52 drain out through openings 60 located above strip 52, as shown in the right hand device 44 in Fig. 8, and the liquids scraped off the other roll are drained through openings 62 located below horizontal strip 52 as shown in the left hand device 46 in Fig. 8. It will be understood that whether the drain openings are placed above or below the horizontal strip 52 depends on the direction of rotation of the roll. As shown in Fig. 5 rolls 14 and 15 rotate in counterclockwise direction and therefore liquids scraped off roll 14 by strip 52 on shell 44 will collect above this strip while the liquids scraped from roll 15 by strip 52 on shell 46 will collect below this strip. As will be best seen from Fig. 4 there is at least one drain opening between any two strips 54 and where the space between any two strips 54 is relatively large, or where the amount of liquid delivered is relatively large, two or more drain openings can be provided as shown at 63 in Fig. 4. Also the sizes of the openings can be varied as shown.

In order to prevent intermingling of the various liquids as they flow out through their respective drain openings, walls or partitions 64 are provided on the outer, convex surfaces of the shells 50. By this arrangement, a liquid flowing out through the left hand end opening 60 in Fig. 6 will be confined by the ribs 64 located on either side of this opening and so on.

To the same end, I provide each of the drain openings 62 with a pouring spout or lip 66, which is only shown in Fig. 15, whereby liquids flowing through the various drain openings will overshoot the convex outer surface of the shells instead of flowing over the curved surfaces of the shells. In practice, either the partitions 64, or the spouts 66, or both, can be used depending on requirements. It is to be understood that the pouring spout 66 is to be considered as being shown in all of the other figures of the drawing.

The shells 50 are provided with corresponding upper and lower lugs 70 in which are mounted upper and lower spring rods 72 and 73 so that when the shells are placed back to back as shown in Figs. 7 and 8, the rods 72 will be parallel. In order to force the shells apart and cause them to contact the rolls 14 and 15, I use the detachable spacer S which is best shown in Fig. 8. The spacer S has an elongated body portion 74 the width of which is greater than the space between rods 72 on one shell and rod 73 on the other shell. Also, the spacer is provided with upper and lower notches 76 for receiving rods 72 and upper and lower notches 78 for receiving rods 73.

To apply devices 44 and 46 to the reel, they are placed in the position shown in Figs. 2 and 5 with the concave faces of the shells 50 facing

5

rolls 14 and 15. The spacer S is then inserted between rods 72 and 73 with the broad surfaces of the spacer parallel with these rods. When the spacer has been moved downwardly until the notches 76 and 79 are in registration with rods 72 and 73, the spacer is rotated to the position of Fig. 7. In this position, the rods 72 and 73 are seated in the corresponding notches 76 and 78 and because the width of the body portion 74 of the spacer is greater than the space between the rods 72 and 73, the rotation of the spacer to the position of Fig. 7 tends to bow the spring rods outwardly, or in the direction of the rolls. This bowing of the springs reacts against the shells and causes the strips 52 and 54, on the concave faces of shells 50, to contact the adjacent surfaces of rolls 14 and 15 with a yielding, following pressure. By this arrangement, the action of the spring rods will compensate for reasonable wear of the rolls 14 and 15 or of the strips 52 and 54 and will thus prolong the useful life of these parts. When the capacity of the spring rods 72 and 73 to flex is exhausted, a somewhat wider spacer may be used, or new spring rods may be installed, or the strips 52 and 54 may be replaced, as may be indicated. By making the strips 52 and 54 softer than the rolls, the strips will wear out instead of the rolls and since the strips can be easily and inexpensively replaced, great economy and convenience are achieved.

When the spacer is in the position of Fig. 7, the devices 44 and 46 are held firmly in position. When the spacer S is turned through 90 degrees, the spacer itself and the devices 44 and 46 are readily removable.

In Figs. 9 to 14 I show different arrangements for mounting the scraping and segregating devices 44 and 46. Since the structure of the shells 50, the strips 52 and 54 and the drain openings 60 and 62 will be the same in all the embodiments shown, these parts will not be again described and will be designated by the same reference characters in all figures of the drawing.

In the embodiment of Figs. 9 and 10, one of the shells is provided with a plate 80 having a shouldered seat 82 and the other of the shells is provided with a plate 84 having a finger 86 adapted to engage the seat 82. It will be noted that the outer, contiguous faces of the plates 80 and 84 are convex so that when the parts are in the position of Fig. 9 the portions of the plates 80 and 84 and of the shells 50 which are below a line passing through the centers of rolls 14 and 15 will tend to rotate in opposite directions, thus urging the strips 52 and 54 carried by the concave sides of the shells 50 to contact the adjacent surfaces of rolls 14 and 15 with a following pressure which is a function of the forces tending to rotate the devices 44 and 46. Because the combined width of the plates 80 and 84, at their upper ends is greater than the distance between the central peripheries of rolls 14 and 15, the shells 50 can not fall or pass downwardly between the rolls. On the other hand, the left hand shell 50 which carries plate 84 can be readily lifted upwardly, as viewed in Fig. 9, whereupon the other shell can also be lifted.

In Figs. 11 and 12, I use a threaded stud 86 which engages upper and lower wedges 88 and I provide T-shaped members 90 having recesses 92 for engaging the spring rods 72 and 73. The ribs or stems 94 of the T-shaped members 90 slidably engaging grooves 95 in the adjacent sides of the wedges 88. By this construction, if the stud 86 is turned in one direction, the wedge

6

blocks are backed off, or moved away from each other to decrease pressure against the spring rods 72 and 73, and if the stud is turned in the opposite direction the wedge blocks are moved towards each other and exert increased pressure against the spring rods, thus regulating the pressure with which the strips 52 and 54 on the concave faces of the shells 50 will contact the rolls 14 and 15. To remove the devices 44 and 46 the stud 86 is turned in the first mentioned direction until the upper and lower wedge blocks 88 are completely disengaged from the stud.

In Figs. 13 and 14 the opposite shells 50 are pivotally secured together by means of a rod or pin 96 which rotatably engages lugs 97 carried by the outer, convex sides of the shells 50. In this arrangement flat springs 98 are secured to one of the shells, as at 99, and serve to urge the shells apart.

In all cases, the various liquids removed by strip 50 and drained through openings 60 and 62 are received in a trough 100 located below the lower edges of the shells 50. The trough 100 is provided with partitions 102 which form separate compartments for receiving the various liquids. A drain pipe 104 leads from each compartment in the trough to conduct the liquid reaching such compartment to a point of disposal or reclamation.

The trough may be detachably secured in position in any desired manner and the pipes leading from the trough are also detachably secured to facilitate assembling and dismantling of the parts.

What I claim is:

1. A wiping device for removing liquid from the surface of a rotatable member, said device including a body, a plurality of wiping elements carried by said body and adapted to contact said member, and means urging said body and said wiping elements against said member with a following pressure, one of said wiping elements extending longitudinally of the axis of rotation of said member and at least one of said wiping elements extending transversely of the axis of rotation of said member.

2. A device for removing liquid from an elongated rotatable roll, said device including an elongated, transversely arcuate shell, wiping means carried by, and projecting beyond, the concave face of said shell including a first strip extending longitudinally of the axis of rotation of the roll and a second strip extending transversely of said axis of rotation, and means urging said shell and said wiping means against said roll with a following pressure.

3. The structure recited in claim 2 in which said strips are formed of a material which is softer than the material from which the roll is made.

4. The structure recited in claim 2 in which said shell has at least one opening formed therein between a longitudinal edge thereof and said first strip.

5. A device for removing liquid from an elongated rotatable roll, said device including an elongated, transversely arcuate shell, wiping means carried by the concave surface of said shell and including an elongated strip disposed between the longitudinal edges of said shell and projecting beyond the concave surface thereof and a plurality of spaced, transverse strips disposed at an angle to said elongated strip and projecting beyond the concave surface of said shell, and means for urging said shell and said

